Rada-Pulser Sr.

KAY ELECTRIC COMPANY

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570A

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Div. or Dept. ....

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....

....

Send extra manual on Model .... •

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TEAR OFF AT THIS LINE

INSTRUCTION BOOK

ISSUE C

Rada-Pulser Sr.

KAY ELECTRIC COMPANY

MAPLE AVENUE • PINE BROOK, N. J. • CAPITAL 6-4000

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RADA-PULSER SR.

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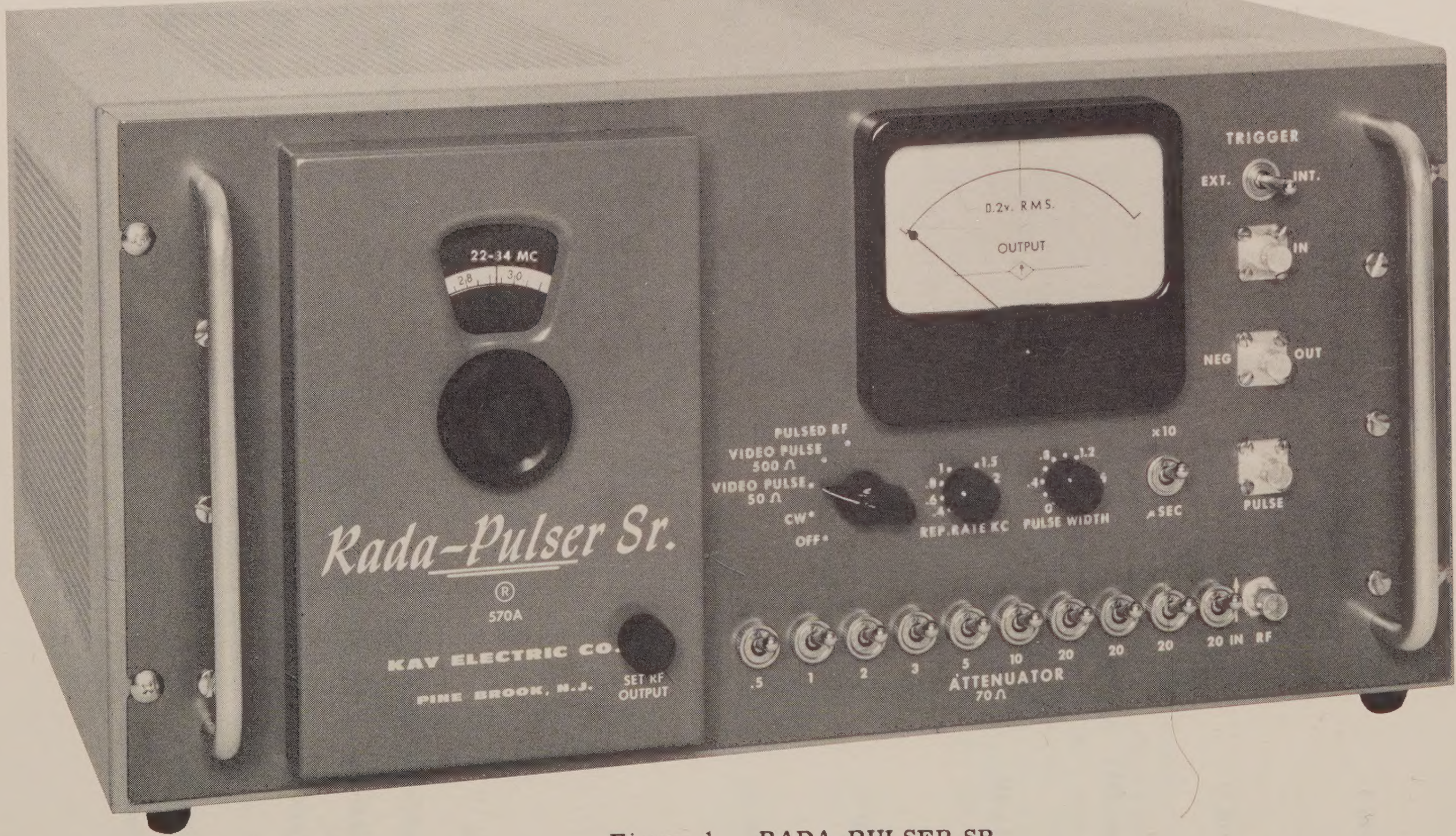

Rada-Pulser Sr.
®
570A
KAY ELECTRIC CO.
PINE BROOK, N.J.
22-34 MC
28
30
SET RF OUTPUT
0.2v. R.M.S.
OUTPUT
PULSED RF
VIDEO PULSE 500 Ω
VIDEO PULSE 50 Ω
CW
OFF
REP. RATE KC
PULSE WIDTH
x10
μSEC
TRIGGER
EXT.
INT.
IN
NEG
OUT
PULSE
.5
1
2
3
5
10
20
20
20
20 IN
RF
ATTENUATOR
70 Ω

Figure 1. RADA-PULSER SR.

SECTION I

GENERAL DESCRIPTION

A. Application. -

The RADA-PULSER SR. is a CW, pulsed carrier and video pulse generator, designed to be used in testing radar, TV, and other equipment.

In conjunction with an oscilloscope or synchroscope, it may be used to obtain a graphic representation of the steady state and transient response of r-f, i-f, and video amplifiers. The CW and pulsed r-f outputs cover a range of 12 to 80 mc in five overlapping bands. Both the pulse repetition rate and the pulse width are continuously variable over wide ranges.

B. Description. -

In addition to the power supply, the RADA-PULSER SR. is composed of the following basic circuits:

1. Push-pull r-f oscillator,
2. Push-pull buffer amplifier and gate,
3. Repetition rate multivibrator,
4. Thyratron-type, pulse-forming circuit,
5. A 101.5-db ten-step attenuator.

The push-pull r-f oscillator is used, during CW and pulsed r-f operation, to generate an r-f carrier in the 12 to 80 mc range.

The buffer amplifiers are used, in CW and pulsed r-f operation, as push-pull amplifying and gating elements. During pulsed r-f operation, these tubes are gated by the pulse forming circuit. The output of the buffer amplifier is fed via the attenuator and the R-F OUTPUT jack to the circuit under test.

The pulse-shaping circuits may be triggered either by an externally-supplied signal or by a pulse from the internal multivibrator. A separate jack brings out a portion of the triggering pulse to provide a means for synchronizing external accessories. Both the pulse width and the pulse repetition rate are adjustable over a wide range. Two successive thyratrons are used to shape the leading and trailing edges of the pulse. In r-f pulse operation, this pulse is used to activate the normally cut-off buffer amplifier. In video pulse applications, the pulse is taken off through a separate amplifier and output.

C. Specifications. -

1. Carrier Frequency Range: 12 mc to 80 mc, with calibrated tuning in five overlapping ranges (12-17 mc, 17-25 mc, 25-35 mc, 35-55 mc, and 55-80 mc).

2. Outputs:

TYPE	AMPLITUDE	IMPEDANCE
CW Pulsed R-f	0.2 volts r.m.s. carrier	50 or 75 ohms, as specified.
Rectangular video pulse 50 ohms	-0.5 volts r.m.s.	
500 ohms	-5.0 volts r.m.s.	500 ohms

3. Pulse Characteristics:
   Width: Continuously adjustable, in two calibrated ranges, from 0.25 to 20.0 microseconds
   Repetition Rate: Continuously variable over 400 to 4000 pps range.
   Rise and Decay Time: 0.03 microseconds.

4. Pulse-off Level: At least 65 db down.

5. Attenuation: Constant impedance, in steps of 0.5 db, to total of 101.5 db.

6. Trigger Input Required: 30-volt pulse, negative.

7. Trigger Output: Negative pulse, delayed 0.25 microseconds.

8. Power Requirements: 110 watts, 105 to 125 volts, 60-cps, a-c power.

9. Dimensions: Standard 19" rack panel, 8-3/4" high x 13" deep.

10. Weight: 30 pounds.

D. Equipment Supplied. -

1. RADA-PULSER SR., complete with power supply and rack panel.

SECTION II

INSTALLATION

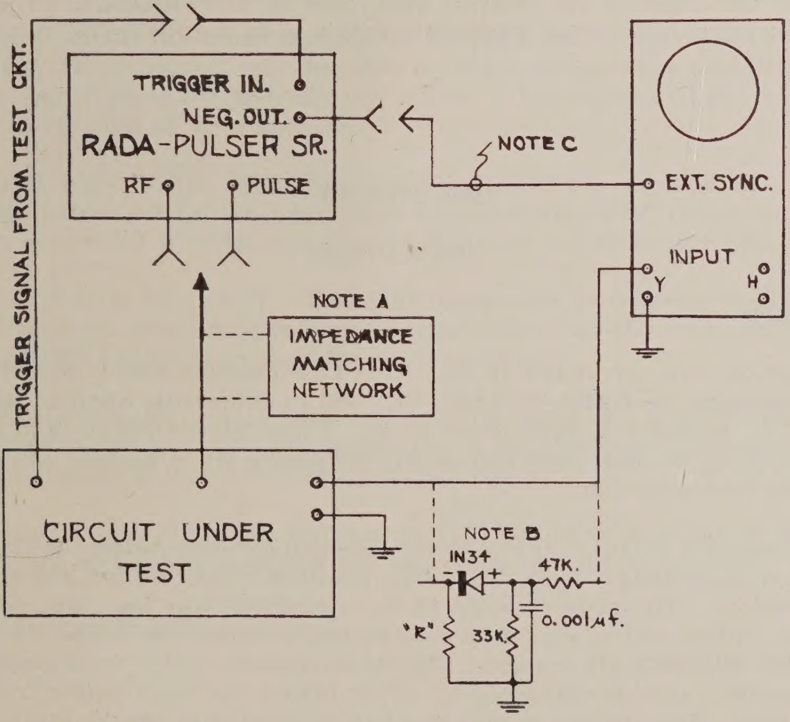
A. General. -

The RADA-PULSER SR. is designed for table-top operation and presents no special installation problems. However, for optimum operation, the equipment should not be subjected to excessive moisture, vibration, or temperature conditions. The installation should also include provisions for connection to an oscilloscope, to the circuit under test, and to a source of 110-volt, 60-cps, a-c power.

B. Interconnection Data. - (See figure 2)

1. Video Equipment Under Test.

The RADA-PULSER SR. is designed to provide CW, pulsed r-f, and video pulse outputs at either a 50-ohm or 75-ohm level, as specified by the customer. If the input impedance of the circuit under test matches the RADA-PULSER SR. output impedance, use the BNC-fitted cable assembly to make a direct connection from the PULSE or R-F jack to the circuit under test. If the input impedance of the circuit under test differs substantially from the specified RADA-PULSER SR. output, an impedance-matching network should be inserted in this circuit for CW and pulsed r-f operation. When the RADA-PULSER SR. is used as a video pulse generator, mismatch conditions are less important and direct connection may be made between the PULSE output jack and the circuit under test.


TRIGGER SIGNAL FROM TEST CKT.
TRIGGER IN.
NEG. OUT.
RADA-PULSER SR.
RF
PULSE
NOTE C
EXT. SYNC.
INPUT
Y
H
NOTE A
IMPEDANCE MATCHING NETWORK
CIRCUIT UNDER TEST
NOTE B
IN34
47K.
"R"
33K.
0.001µf.

NOTES

A. If input impedance of circuit under test is not 70 ohms, use impedance-matching network in input.

B. If bandpass of oscilloscope is less than that of circuit under test, insert illustrated detector circuit in output circuit. Value of "R" determined by load requirements of tested circuit.

C. If synchronizing pulse is required for scope or other external circuit, connect coaxial cable directly from NEG OUT jack to circuit in question.

Figure 2. Interconnection Block Diagram

2. Oscilloscope.

   a. If the range of the oscilloscope includes the frequency at which the RADA-PULSER SR. is being operated, connect the output of the circuit under test directly to the vertical (Y) axis of the oscilloscope. However, if it is necessary to use an oscilloscope whose range falls short of the RADA-PULSER SR. output, a detector circuit must be inserted in the output of the circuit under test.

   b. Using the coaxial cable assembly supplied with the RADA-PULSER SR., connect the NEGative OUTput terminal directly to the external sync terminal of the oscilloscope.

3. External Pulse Generator.

If an externally-supplied voltage is used to trigger the pulse-forming circuits, connect the output of the external generator to the (TRIGGER) IN jack. Make certain that EXTernal-INTernal TRIGGER switch is in the EXTernal position.

SECTION III

OPERATION

A. Description

1. Function selector switch (S-2). This five-position rotary switch is used both to energize the RADA-PULSER SR. and to determine whether its output will be CW, pulsed r-f, or a video pulse. When this switch is in any position other than OFF, the dial light comes on, indicating B+ is applied and equipment is ready for operation.

2. Frequency Control. This control, located directly below the frequency dial, is a dual control comprising a five-position rotary switch and a variable capacitor. The rotary switch (S-4) is controlled by the outer portion of the dual control and is used as a bandswitch to select one of the five overlapping RADA-PULSER SR. ranges. The inner portion of the front panel control tunes the variable capacitor (C-22) to obtain the exact output frequency desired. The frequency dial itself is calibrated in 500-kc divisions.

3. REPetition RATE Control (R-5). This dual potentiometer controls the repetition rate of the video and r-f pulse circuits. It provides calibrated variation over a continuous range of 400 to 4000 pps.

4. Pulse Width Range Switch (S-3). When this toggle switch is in the lower (μSEC) position, the adjacent PULSE WIDTH potentiometer may be used to set the pulse duration to any point in the 0.25 to 2.0 microsecond range. By throwing the switch to the upper (X10) position, the range may be shifted to cover durations of 2.5 to 20 microseconds.

5. PULSE WIDTH Potentiometer (R-18). This control enables the operator to vary the pulse width continuously over the range (.25 to 2.0 or 2.5 to 20 microseconds) selected by the adjacent toggle switch.

6. EXTernal-INTernal TRIGGER Switch (S 1). The position of this toggle switch determines whether the pulsing circuits are excited by an external triggering pulse or by an internally-generated signal.

7. RF ATTENUATORS. These ten fixed, switchable attenuators allow the operator to attenuate the r-f output in steps of 0.5 db over a range of zero to 101.5 db.

8. SET RF LEVEL Control (R-35). When the RADA-PULSER SR. is used as a CW source, this potentiometer is used to set the output to a predetermined level before using the switched attenuators. Once this level is set, the RADA-PULSER SR., when switched to "Pulsed RF", will deliver RF pulses having the same amplitude as the CW output.

9. R.F. Jack (J-4). When the RADA-PULSER SR. is used as the source of either CW or pulsed r-f, the final output is taken off at this BNC connector. The output level for both CW and pulsed r-f is a nominal 0.2 volts r.m.s. into a 50-ohm or 75-ohm load.

10. PULSE Jack (J-3). When the RADA-PULSER SR. is used as a source of video pulses, the final output is available at this BNC connector. The output is a nominal 0.5 volts peak into 50 ohms or 5.0 volts into 500 ohms.

11. TRIGGER IN Jack (J-1). This BNC connector provides a means of feeding in the external triggering voltage required when the INTernal-EXTernal TRIGGER switch is in the EXTernal position.

12. NEG. OUT Jack (J-2). This connector brings out a negative pulse which leads the r-f output by 0.25 microseconds. It may be used to synchronize an oscilloscope or any other external equipment.

13. Meter (M-1). When the RADA-PULSER SR. is used as a CW signal source, this d-c voltmeter monitors the signal fed into the attenuator.

B. Operating Instructions.

1. Use as CW source.

    a. Connect R-F output jack to circuit under test.
    b. Set function selector switch to "CW" position.
    c. Turn outer portion of frequency control until correct band is obtained.
    d. With inner portion of frequency control, tune RADA-PULSER SR. output to exact frequency desired.
    e. Vary the SET RF OUTPUT control to obtain 0.2 volt reading on meter.
    f. Use RF ATTENUATOR controls to obtain desired degree of attenuation. Note that these attenuators are additive and may be used in any desired combination.

2. Use as source of pulsed RF.
    a. Connect RF output jack to circuit under test.
    b. Set function switch to "PULSED RF" position.
    c. Turn outer portion of frequency control until correct band is obtained.
    d. With inner portion of frequency control, tune RADA-PULSER SR. output to exact frequency desired.
    e. If internal triggering is desired, set EXTernal-INTernal TRIGGER switch to "INTernal" position.
    f. Where an external source of triggering voltage is to be used, set switch to "EXTernal" position. Connect source of triggering voltage to TRIGGER IN jack.
    g. Connect NEG. TRIGGER OUT jack to oscilloscope.
    h. Set REP RATE control to desired repetition rate.
    i. For pulse widths between 0.25 and 2.0 microseconds, set toggle switch to lower (μSEC) position. For pulse width between 2.5 and 20.0 microseconds, place switch in upper (X10) position.
    j. Use RF ATTENUATOR controls to obtain desired degree of attenuation.

3. Use as source of video pulses.
    a. Connect PULSE jack to circuit under test.
    b. Set function switch to either "VIDEO PULSE 500 OHMS" or "VIDEO PULSE 50 OHMS" position, according to input impedance of circuit under test.
    c. If internal triggering is desired, set EXTernal-INTernal TRIGGER switch to "INTernal" position.
    d. Where an external source of triggering voltage is to be used, set EXTernal-INTernal switch to "EXTernal" position. Connect source of triggering voltage to TRIGGER IN jack.
    e. Connect NEG. TRIGGER OUT jack to oscilloscope.
    f. Set REP RATE control to obtain desired repetition rate.
    g. For pulse widths between 0.25 to 2.0 microseconds, set toggle switch to lower (μSEC) position. For pulse widths between 2.5 and 20.0 microseconds, place switch in upper (X10) position.
    h. Use PULSE WIDTH potentiometer to obtain exact pulse width desired.

SECTION IV

THEORY OF OPERATION

A. General. -

The basis circuits of the RADA-PULSER SR. include the r-f generator, the pulse-forming unit, and as a power supply. During CW and pulsed r-f operation, the r-f generator produces a carrier in the 12 to 80 mc range at a point determined by the position of the frequency control bandswitch, S-1.

The pulse-forming circuits utilize either the output of a variable frequency multivibrator or an externally-supplied signal to produce a rectangular video pulse. In pulsed-carrier operation, these pulses are used to gate the r-f amplifier output. In video-pulse operation, the r-f carrier circuits are disabled and the video pulse is fed directly to the circuits under test.

B. R-F Unit. -

1. R-F Oscillator (V-8, V-9)

These two 6AK5 pentodes form a push-pull oscillator with the tank circuit connected between the two plates. A four-wafer rotary bandswitch (S-4) selects the proper inductances for each band; a split-stator capacitor (C-22) tunes the circuit to the exact frequency desired. Both the rotary switch and the variable capacitor are controlled by coaxial front-panel controls. Each side of the tank circuit is connected through an R-C divider (C-29, C-30, C-31, and C-32, R-41, R-42, R-43 and R-44) to the push-pull buffer amplifier.

2. Buffer Amplifiers (V-10 and V-11).

The buffer amplifier consists of two 6BH6 pentodes connected in push-pull. The r-f voltage is developed across an output transformer (T-1) which is connected between the two plates. The secondary of T-1 is connected directly to the attenuator and through it to the R-F jack (J-4). On CW operation, the RF output is monitored by a d-c milliameter. The circuit is designed to provide equal output amplitudes for both CW and pulsed r-f operation. Both cathodes are tied together and connected through the function selector switch (S-2) to the cathode of the pulsing unit output stage (V-7).

On CW operation, the amplifier cathodes are tied to ground and the stage is operated class A. In pulsed r-f operation, the cathodes are held at a nominal +50 volts, biasing the amplifiers beyond cut-off until the negative-going signal from the pulse unit is applied. This 50-volt pulse drops the cathode voltage and allows the tubes to conduct for a period determined by pulse duration.

C. Pulse-Forming Circuits. -

1. Multivibrator (V-1).

This stage is a 12AU7 dual triode used in a conventional free-running multivibrator circuit. The multivibrator output is a triggering pulse having a repetition rate, in the 400 to 4000 cps range, determined by the setting of the REPetition RATE potentiometer (R-5). When the EXTernal-INTernal TRIGGER switch (S-1) is in the INTernal position, the multivibrator output is coupled to the grid of the sync amplifier (V-2).

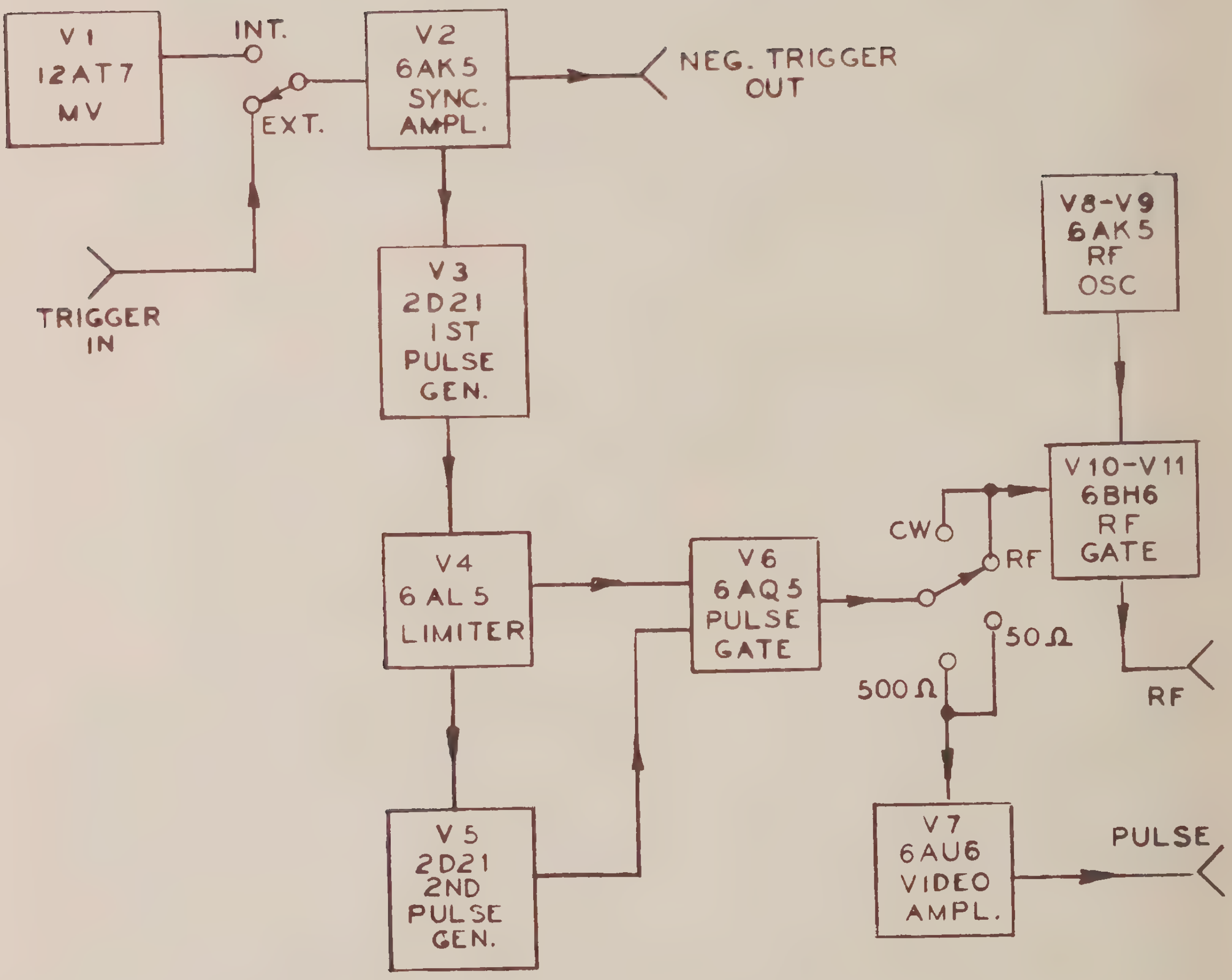

V1
12AT7
MV
INT.
EXT.
TRIGGER IN
V2
6AK5
SYNC.
AMPL.
NEG. TRIGGER OUT
V3
2D21
1ST
PULSE
GEN.
V4
6AL5
LIMITER
V5
2D21
2ND
PULSE
GEN.
V6
6AQ5
PULSE
GATE
CW
RF
50 Ω
500 Ω
V7
6AU6
VIDEO
AMPL.
PULSE
V8-V9
6AK5
RF
OSC
V10-V11
6BH6
RF
GATE
RF

Figure 3. Functional Block Diagram

2. Sync Amplifier (V-2).

This tube, a 6AK5 pentode, is used as a simple buffer amplifier for the triggering signals. According to the position of the TRIGGER EXTernal-INTernal switch (S-1), it takes its input either from the TRIGGER IN jack (J-1) or the multivibrator (V-1). The cathode of V-2 is connected directly to the NEGative TRIGGER OUT jack (J-2), providing a negative synchronizing pulse (which lags the pulsed output by 0.25 microseconds) for the oscilloscope or other external equipment. The positive pulse output of V-2 is fed directly to the grid of the first thyratron, V-3.

3. Pulse Generator.

The pulse generator comprises a pulse-gating tube (V-6), a limiting diode (V-4), and two separate thyratrons (V-3 and V-5), which are used respectively to cut-off and to reactuate the gating tube. During the interval in which the gating tube is cut-off, a rectangular negative pulse is produced at the cathode of this stage. Depending on the position of the function switch, this pulse may be fed either to a pulse buffer-amplifier and output jack or to the cathodes of the push-pull r-f buffer-amplifier.

In operation, the positive pulse generated by the sync amplifier (V-2) is fed directly to the grid of the first thyratron (V-3). When this thyratron fires, the discharge of C-8 puts a negative voltage, via diode V4-A, on the control grid of the normally conducting gating tube (V-6). When V-6 is cut off, the voltage at its cathode and at wafer e of function selector switch S-2 is driven in a negative direction. Simultaneously, the plate voltage of this tube rises to +250 volts, causing C-11 to charge through R-18, the PULSE WIDTH potentiometer, increasing the voltage on the grid of thyratron V-5.

The rate of charge of this capacitor and thus the firing time of thyratron V-5 is determined by the setting of the PULSE WIDTH potentiometer (R-18), and the position of the pulse width (X10-μsec) switch (S-3). The firing of the thyratron drives the plate of V-4B more positive, allowing C-9 to discharge and raising the grid voltage of pulse gate tube V-6 to a point where this stage begins to conduct again.

During the period the gate tube is cut off, a rectangular negative pulse appears at wafer e of S-2, the function selector switch. In pulsed r-f operation, the negative pulse is applied to the cathode of the r-f buffer-amplifiers (V-10, V-11), driving them into conduction. When the RADA-PULSER SR. is used to supply video output tube, V-7, which provides a similar low-impedance pulse to the PULSE jack (J-3).

SECTION V

MAINTENANCE

A. Trouble Location. -

If the operation of the RADA-PULSER SR. appears to be defective in any respect, first ascertain that the cause of improper operation is not in the oscilloscope, the circuit under test, the external pulse generator (if used), or the interconnecting cables. If a process of elimination indicates that the trouble originates in the RADA-PULSER SR., make the following preliminary checks:

1. Check the operation of all RADA-PULSER SR. functions to determine the exact nature and extent of the defect.
2. Make a visual check to determine that all filaments are lit and that there are no loose connections or obviously damaged components.
3. Check the voltage level at the a-c line, and the B+ output.

The most common troubles encountered with the RADA-PULSER SR. are weak or defective tubes, drifts in component values, and occasional misalignments. The trouble-location chart below may be used as a guide to isolate the trouble to a particular circuit or stage. Figure 4, a complete schematic diagram of the RADA-PULSER SR., indicates the normal voltage measurements at significant points in the circuitry. The physical location of all tubes, potentiometers, switches, and other major components is indicated on figures 5 and 6, the component location diagrams.

B. Alignment & Adjustment

1. Pulse Width Adjustment- Whenever Thyratron V-5 is replaced, check the alignment of these circuits.
   - a.) Connect the PULSE output jack to the vertical (Y) axis of the scope. Set function selector switch (S-2) to either the 50-ohm or the 500-ohm VIDEO PULSE position.
   - b.) Set Pulse Width Range switch (S-3) to X10 position. Rotate PULSE WIDTH potentiometer completely clockwise.
   - c.) Adjust R-11, located on right side of chassis, for proper pulse width (20 μsec).
   - d.) Rotate Pulse Width potentiometer (R-18) counter clockwise to 2μ sec position. Adjust variable capacitor C-13 for correct pulse width.
   - e.) Re-check 20μsec setting. Adjust R-11 and C-13 alternately until range extends slightly beyond the specified limit on each end.
   - f.) Set Pulse Width Range switch (S-3) to μsec position. Turn PULSE WIDTH potentiometer (R-18) completely clockwise.

Trouble-Shooting Chart

SYMPTOM	SERVICING PROCEDURES
Output O.K. on VIDEO PULSE, but not on CW or PULSED R-F.	Check r-f oscillator (V-8 and V-8 and V-9) and amplifier (V-10 and V-11).
Output O.K. on CW and PULSED R-F, but defective on VIDEO PULSE.	Check 6AU6 Video output tube (V-7).
Output O.K. on CW but defective on PULSED R-F and VIDEO PULSE.	
a. With INTernal-EXTernal TRIGGER switch (S-1) on INTernal.	Check multivibrator, V-11.
b. With INTernal-EXTernal TRIGGER switch (S-1) on EXTernal.	Check first 2D21 thyratron (V-3), diode V-4, sync amplifier (V-2).
Inability to obtain minimum pulse width (0.2 μsec).	Check bias adjust potentiometer, R-111, and second thyratron, V-5.
Pulses triangular at maximum widths, rectangular at minimum widths.	Check C-8 and C-9 for increased capacitance or open.
Excessive carrier leakage during pulse off periods.	Check shields on r-f oscillator and amplifier stages.
Generally erratic pulsing.	Check d-c power supply output.
Triangular pulses of uncontrollable width.	Check second thyratron, V-5.
Low meter reading.	Check meter circuit diodes, D-1 and D-2.

g.) Adjust 1.5-7 uuf variable capacitor C-12 for correct pulse width.

h.) Rotate PULSE WIDTH potentiometer counter clockwise to 0.25 μsec position. Check pulse width, readjusting C-12 if necessary.

j.) Re-check the upper and lower limits on each range, readjusting R-11, C-12, and C-13 where necessary.

NOTE: If difficulty is experienced in obtaining a pulse width as low as 0.25 μsec, replace the 2D21 (V-5). The selection of a replacement for this tube may be critical.

2. Repetition Range Adjustment.

a.) Set function selector switch (S-2) to one of the pulse positions.

b.) Set EXTernal-INTernal switch to INTernal.

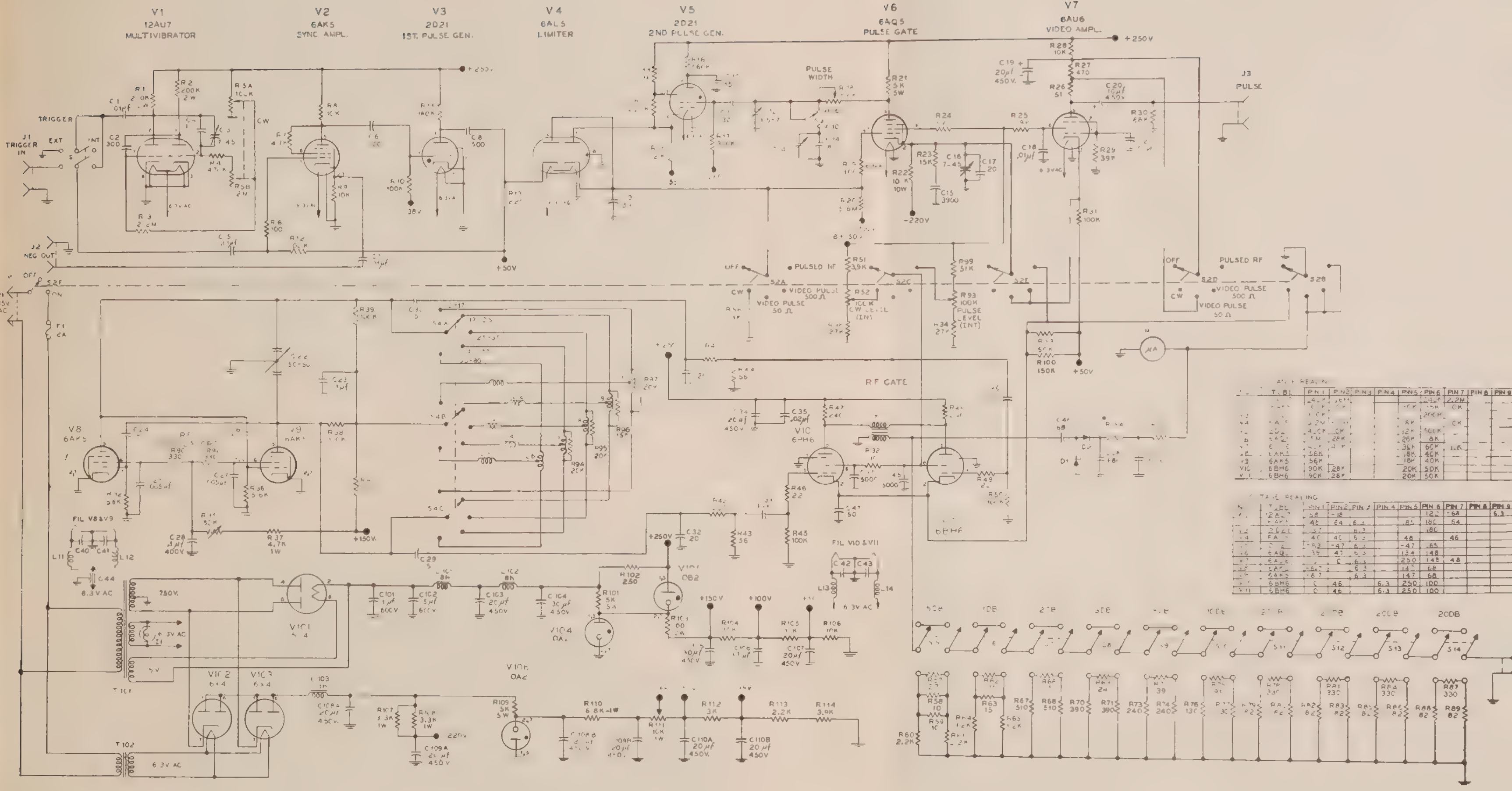
c.) Connect multivibrator output (pin 1 of V-1) to the vertical (Y) axis of the 'scope. Connect the output of an external audio oscillator to the horizontal (X) axis terminal.

d.) Set REPetition RATE potentiometer to 4000.

e.) Adjust 7-45 uuf variable capacitor (C-3) for zero beat.

f.) Decrease REPetition RATE setting to 400. Readjust audio oscillator setting and check for zero beat at 400. If necessary, readjust C-3.

g.) Re-check first high setting, then low setting, readjusting C-3 each time until both extremes are optimized.


V1
12AU7
MULTIVIBRATOR
V2
6AK5
SYNC AMPL.
V3
2D21
1ST. PULSE GEN.
V4
6AL5
LIMITER
V5
2D21
2ND PULSE GEN.
V6
6AQ5
PULSE GATE
V7
6AU6
VIDEO AMPL.
+250V
PULSE WIDTH
J3
PULSE
J1
TRIGGER IN
TRIGGER
EXT
INT
J2
NEG OUT
+50V
-220V
PULSED RF
VIDEO PULSE 500 Ω
VIDEO PULSE 50 Ω
CW
OFF
P1
115V AC
F1
2A
RF GATE
V8
6AK5
V9
6AK5
V10
6BH6
6BH6
+150V
FIL V8 & V9
FIL V10 & V11
6.3V AC
750V
V101
5Y4
V102
5Y4
V103
5Y4
V104
OA2
V105
OA2
V106
OA2
0B2
T101
T102
+150V
+100V
50DB
10DB
20DB
S14

NOTE

1 UNLESS OTHERWISE INDICATED
ALL RESISTANCES IN OHMS
ALL CAPACITANCES IN μμf

2 ● INDICATES FACTORY SELECTED COMPONENT

3 VOLTAGE READINGS TAKEN WITH S2 ON PULSED RF & S4 ON INT.

Figure 4.

Complete Schematic Diagra

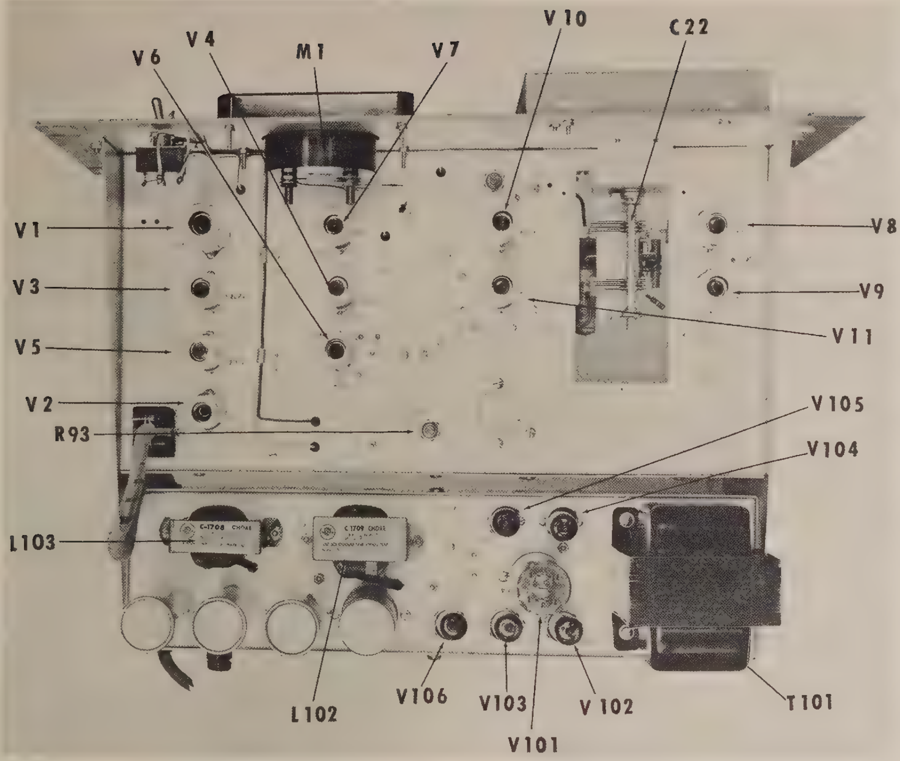

V6
V4
M1
V7
V10
C22
V1
V3
V5
V2
R93
V8
V9
V11
V105
V104
L103
V106
L102
V103
V101
V102
T101

Figure 5. Component Location, Top of Chassis

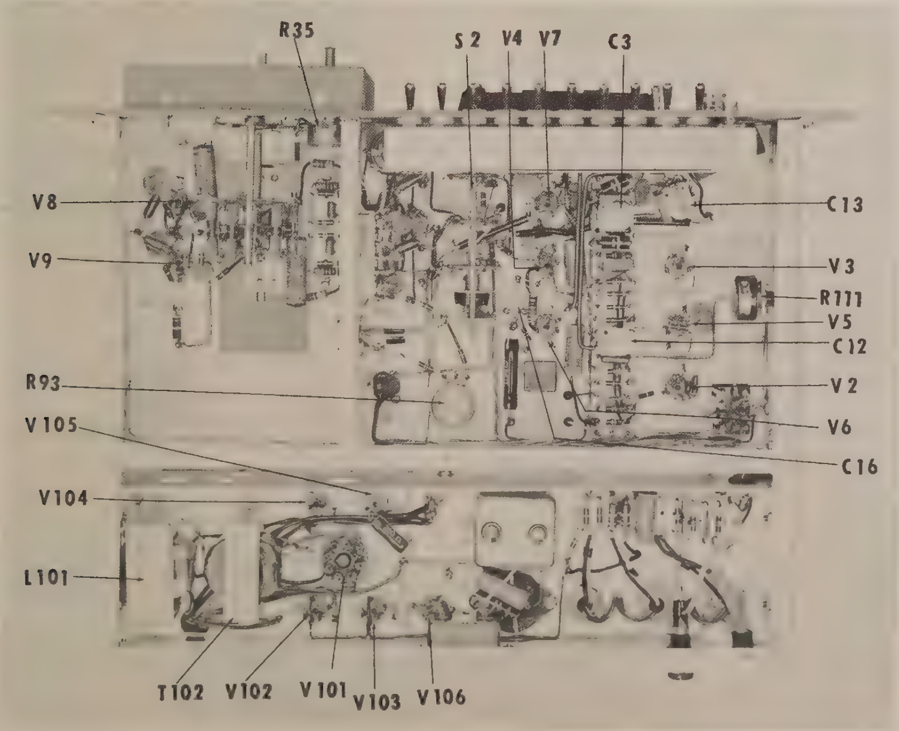

R35
S2
V4
V7
C3
V8
V9
C13
V3
R111
V5
C12
R93
V2
V6
V105
C16
V104
L101
T102
V102
V101
V103
V106

Figure 6. Component Location, Bottom of Chassis

SECTION VI
PARTS LIST

CAPACITORS: (All capacitors in μμF unless otherwise indicated).

C-1	0.01μF
C-2	300
C-3	7-45 variable
C-4	150
C-5	0.01μF
C-6	1100
C-7	0.01μF
C-8	500
C-9	300
C-10	150
C-11	300
C-12	1.5-7 variable
C-13	7-45 variable
C-14	800
C-15	3900
C-16	7-45 variable
C-17	20
C-18	0.01μF
C-19	20μF, 450V, electrolytic
C-20	10μF, 450V, electrolytic
C-21	0.01μF
C-22	MCD-50-M, 50-50 variable
C-23	0.1μF
C-24	5
C-25	5000
C-26	5
C-27	5000
C-28	0.1μF, 400V
C-29	5
C-30	5
C-31	20
C-32	20
C-33	1000
C-34	20μF, 450V; electrolytic
C-35	0.02μF
C-36	1000
C-37	5000
C-38	680
C-39	1000
C-40	0.01μF
C-41	0.01μF
C-42	0.01μF
C-43	0.01μF
C-44	1000, feed thru
C-45	5000
C-46	680
C-47	50

RESISTORS: (Unless otherwise indicated, all components are fixed composition, ½ watt, 10% tolerance resistors.)

R-1	200K, 2W
R-2	200K, 2W
R-3	2.2M
R-4	470K
R-5	A. 100K dual pot. REP. RATE B. 2M
R-6	100
R-7	4.7K
R-8	10K
R-9	10K
R-10	100K
R-11	180K
R-12	100K
R-13	220
R-14	2200
R-15	2K
R-16	560K
R-17	390K
R-18	100K pot.
R-19	100
R-20	5.6M
R-21	5K, 5W
R-22	10K, 10W
R-23	15K
R-24	100
R-25	39K
R-26	51
R-27	470
R-28	10K
R-29	39K
R-30	68K
R-31	100K
R-32	5.6K
R-33	1M
R-34	27K
R-35	50K variable
R-36	5.6K
R-37	4.7K, 1W
R-38	100K
R-39	100K
R-40	100
R-41	220
R-42	220
R-43	56
R-44	56
R-45	100K
R-46	22
R-47	240
R-48	240
R-49	22
R-50	100K
R-51	3.9K
R-52	100K CW level
R-53	150K
R-54	factory selected
R-55	100
R-56	1K
R-57	27
R-58	10
R-59	10
R-60	2.2K
R-61	2.2K
R-62	15
R-63	15
R-64	1.2K
R-65	1.2K
R-66	15
R-67	510
R-68	510
R-69	24
R-70	390
R-71	390
R-72	39
R-73	240
R-74	240
R-75	91
R-76	130
R-77	130
R-78	330
R-79	82
R-80	82
R-81	330
R-82	82
R-83	82
R-84	330
R-85	82
R-86	82
R-87	330
R-88	82
R-89	82
R-90	330
R-91	330
R-92	10
R-93	100K, pulse level
R-94	20K
R-95	20K
R-96	15K
R-97	20K
R-98	27K
R-99	51K
R-100	150K

MISCELLANEOUS:

D-1 & D-2	Diodes: 1N294
F-1	Fuse, 2 amp
I-1	Pilot Lamp, Bayonet Type #44
J-1	TRIGGER IN jack, BNC UG-185/U
J-2	NEG OUT jack, BNC UG-185/U
J-3	PULSE jack, BNC UG-185/U
J-4	RF jack, BNC UG-185/U
L-1 thru L-5	15 MH Choke
L-6 thru L-10	Fixed, air core plate-tuning coils
L-11 thru L-14	Filament Choke
M-1	DC Voltmeter
T-1	Output transformer, special

SWITCHES:

S-1	EXT. INT. TRIGGER: DPDT
S-2	Rotary, 5-wafer Function Selector
S-3	SPST Pulse switch
S-4	Rotary, 3-wafer, frequency
S-5 thru S-14	DPDT attenuator switches

TUBES:

V-1	12AU7	V-5	2D21	V-9	6AK5
V-2	6AK5	V-6	6AQ5	V-10	6BH6
V-3	2D21	V-7	6AU6	V-11	6BH6
V-4	6AL5	V-8	6AK5		

POWER SUPPLY -

CAPACITORS:

C-101	1μF, 600V
C-102	0.5μF, 450V, electrolytic
C-103	20μF, 450V, electrolytic
C-104	30μF, 450V, electrolytic
C-105	30μF, 450V, electrolytic
C-106	0.01μF, 500V
C-107	20μF, 150V
C-108	dual electrolytic 2 x 20μF, 450V
C-109	dual electrolytic 2 x 20μF, 450V
C-110	dual electrolytic 2 x 20μF, 450V

RESISTORS:

R-101	5K, 5W
R-102	250
R-103	100, 2W
R-104	10K
R-105	10K
R-106	10K
R-107	3.3K, 1W
R-108	3.3K, 1W
R-109	5K, 5W
R-110	6.8K, 1W
R-111	10K, pot
R-112	3K
R-113	2.2K
R-114	3.9K

MISCELLANEOUS:

L-101 & L-102	Filter Choke, 8H
L-103	Filter Choke, 13H
T-101	H.V. Transformer, Sec. #1, 750 VCT; Sec. #2, 5 VAC; Sec. #3, 6.3 VAC
T-102	Filament Transformer, 6.3 VAC Sec.

June, 1961

ADDENDA

RADA-PULSER SR.

All RADA-PULSER SR. instruments above serial number 19383; plus serial numbers 19362, 76 and 81, are assembled in accordance with Schematic #KD-3001 F. Additions and corrections to the parts lists for this version of the RADA-PULSER SR. and its power supply section are furnished, and the major differences between the two versions are discussed.

CARRIER FREQUENCY RANGE- The low frequency end of the carrier frequency range has been extended to 10 mc. The five overlapping ranges are established as follows: 10 - 15 mc, 15 - 22 mc, 22 - 34 mc, 34 - 53 mc and 53 - 80 mc. (Ref. pg. 1)

VIDEO AMPLIFIER CIRCUIT (V-7)- This stage has been rewired to operate the type 6AU6 tube as a triode instead of a pentode. (See Schematic KD-3001 F).

PARTS LIST (Ref. page 16)- The parts list on page 16 applies to both versions of the RADA-PULSER SR. except as noted here:-

Capacitors:

C-14	500 μμf
C-18	not used
C-19, C-34	This is a dual 20 μf

Resistors:

R-18	150 K
R-25	not used
R-54	390 ohms

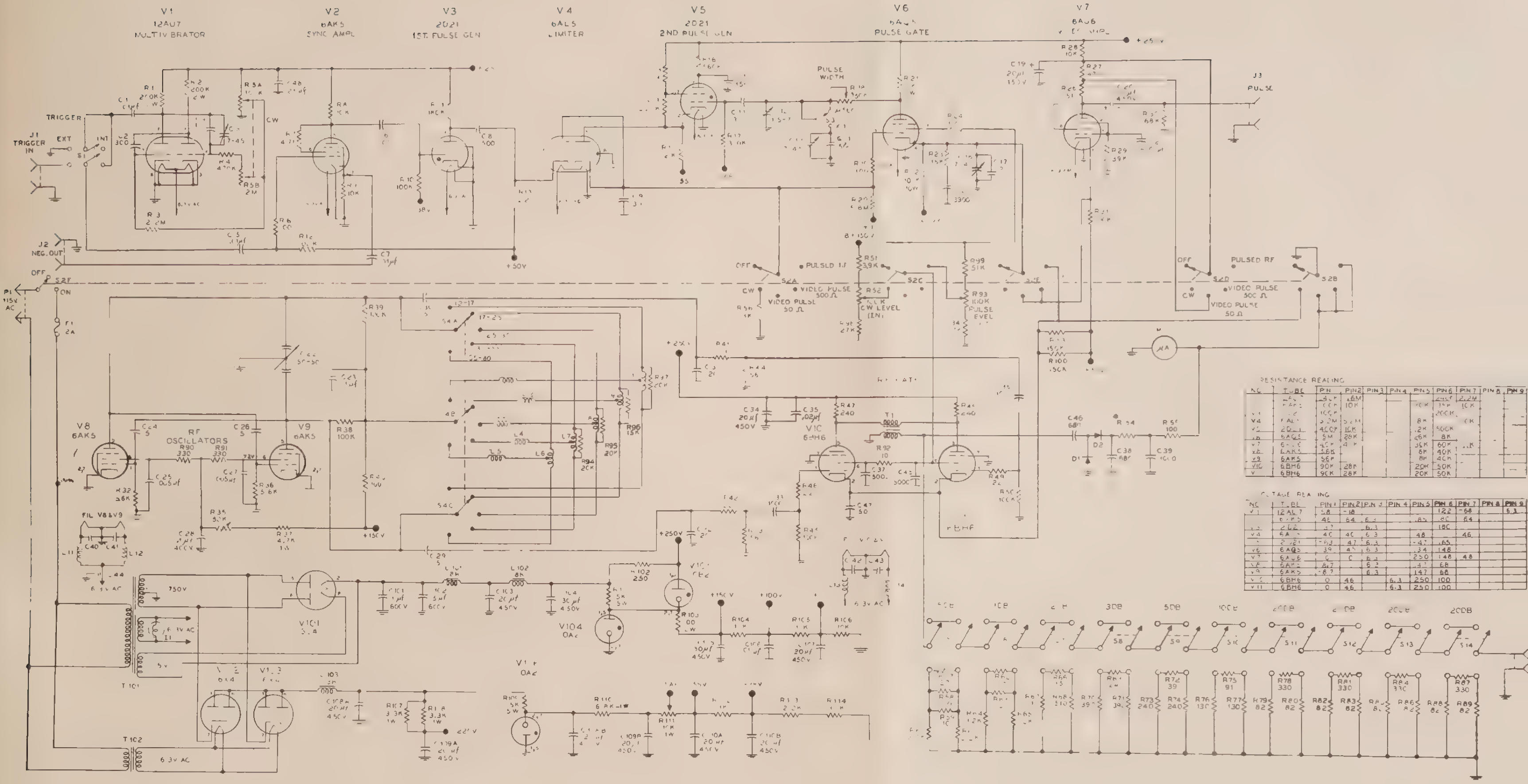
Fuse: F-1 (located on the power supply chassis) 3 amp. 250-V.

Switches: S-3 SPDT

Jack: Power cable jack J-1 (associated with the power supply) is designated as S-312-CCT.

Power Supply Tubes:

V-101	5U4	V-104	OA2
V-102	6X4	V-105	OB2
V-103	6X4	V-106	OA2


V1
12AU7
MULTIVIBRATOR
V2
6AK5
SYNC AMPL
V3
2021
1ST PULSE GEN
V4
6AL5
LIMITER
V5
2021
2ND PULSE GEN
V6
6AQ5
PULSE GATE
V7
6AU6
J1
TRIGGER IN
TRIGGER
EXT
INT
S1
J2
NEG. OUT
J3
PULSE
PULSE WIDTH
CW
+150V
+50V
+250V
+100V
OFF
S2F
ON
P1
115V AC
F1
2A
S2A
S2C
S2D
S2B
PULSED RF
VIDEO PULSE 500 Ω
VIDEO PULSE 50 Ω
CW LEVEL
PULSE LEVEL
S4A
S4B
S4C
12-17
17-25
25-80
V8
6AK5
V9
6AK5
RF OSCILLATORS
R90
330
R91
330
FIL V8 & V9
V10
6BH6
V11
6BH6
T1
D1
D2
µA
V101
V102
V103
V104
0A2
V105
0A2
750V
6.3V AC
5V
T101
T102
3DB
5DB
10DB
20DB
S8
S9
S10
S11
S12
S13
S14

RESISTANCE READING

NO	TUBE	PIN 1	PIN2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9
[illegible]	[illegible]	[illegible]	.6M				[illegible]	2.2M		
[illegible]	[illegible]	[illegible]	10K			[illegible]	[illegible]	10K		
V3	[illegible]	100K					200K			
V4	[illegible]	2.2M	[illegible]			8K		[illegible]		
V5	2021	400K	10K			.2K	500K			
V6	6AQ5	5M	28K			56K	8K			
V7	[illegible]	[illegible]	[illegible]			35K	60K	[illegible]		
V8	6AK5	56K				8K	40K			
V9	6AK5	56K				8K	40K			
V10	6BH6	90K	28K			20K	50K			
V	6BH6	90K	28K			20K	50K			

VOLTAGE READING

NO	TUBE	PIN 1	PIN2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9
V1	12AU7	58	-18				122	-68		6.3
[illegible]	[illegible]	46	64	6.3		.85	80	64		
V3	2021	[illegible]		6.3			180			
V4	[illegible]	40	40	6.3		48		46		
[illegible]	[illegible]	-63	47	6.3		-47	.65			
V6	6AQ5	39	45	6.3		.34	148			
V7	6AU6	0	0	6.3		250	148	48		
V8	[illegible]	8.7		6.3		.47	68			
V9	6AK5	-8.7		6.3		147	68			
V10	6BH6	0	46		6.3	250	100			
V11	6BH6	0	46		6.3	250	100			

NOTE
1 UNLESS OTHERWISE INDICATED
ALL RESISTANCES IN OHMS
ALL CAPACITANCES IN µuf
2 ● INDICATES FACTORY SELECTED COMPONENT
3 VOLTAGE READINGS TAKEN WITH S2 ON PULSED RF & S1 ON INT

SCHEMATIC DIAGRAM RADA-PULSER SR.
KAY ELECTRIC CO. PINE BROOK, N.J.
KD3001F

AVA/SER AL NO19383 ALSO SER NO19362-76-81

The information given in the above section of this addendum plus the additional information included below covers all RADA-PULSER SR. instruments having serial numbers higher than 23611. Reference should be made to schematic number KD-3001-J.

1. V-7 has been changed from a type 6AU6 to a type 6AH6. The connection between pin 1 and pin 2 of this tube has been removed, and pin 2 has been grounded as shown on schematic number KD-3001-J.

2. The following changes have been made in the parts list:

Capacitors:

C-4	factory selected	C-17	50μf
C-10	300μμf	C-49	3μμf feed thru
C-14	factory selected		

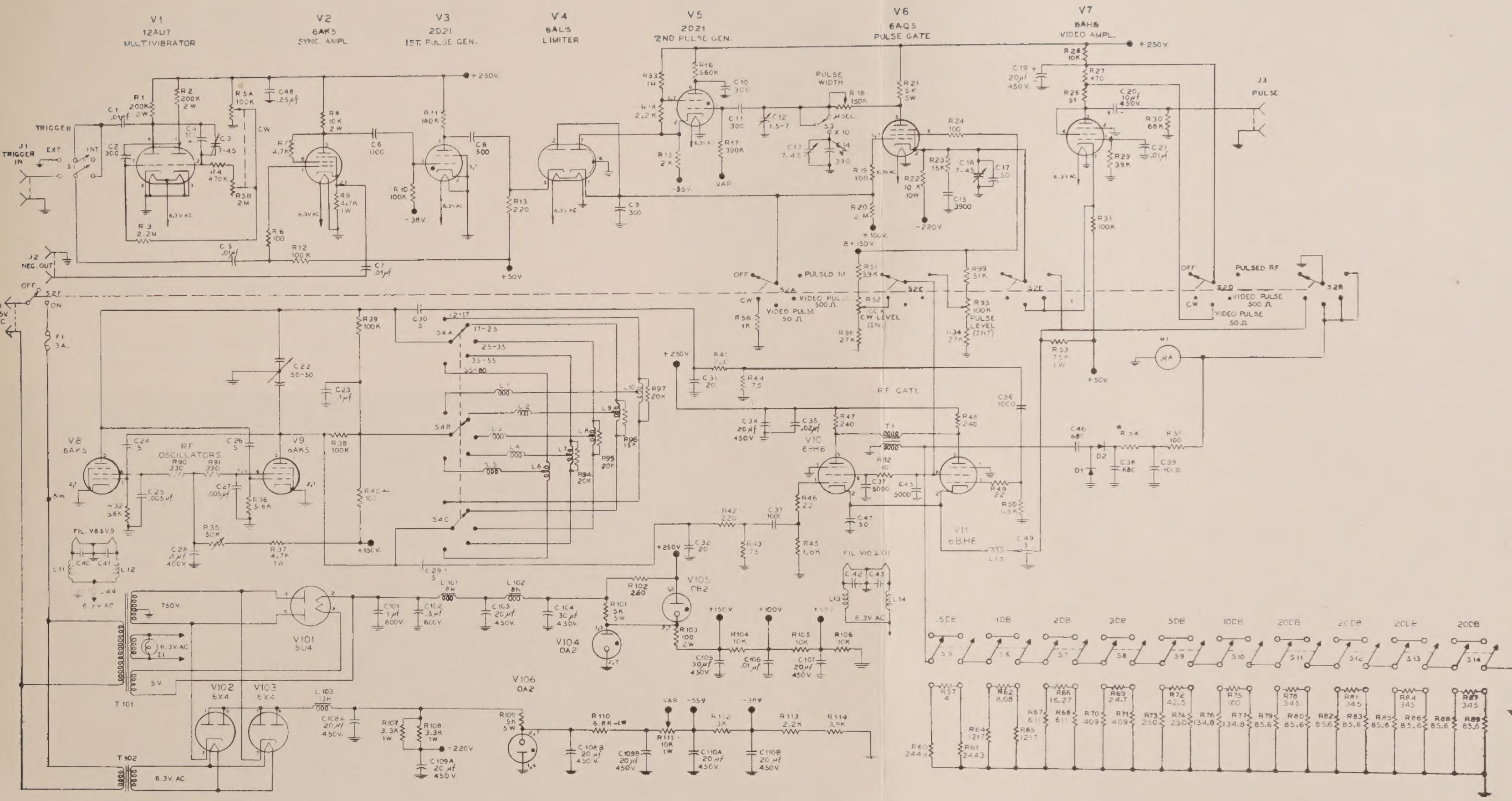
Resistors:

R-8	10 K ohm, 2 watt	R-71	409 ohm, ¼ watt
R-9	4.7 K ohm, 1 watt	R-72	42.5 ohm, ¼ watt
R-20	2 meg ohm, ½ watt	R-73	250 ohm, ¼ watt
R-43	75 ohm, ½ watt	R-74	250 ohm, ¼ watt
R-44	75 ohm, ½ watt	R-75	100 ohm, ¼ watt
R-45	1.8 K ohm, ½ watt	R-76	134.8 ohm, ¼ watt
R-50	1.8 K ohm, ½ watt	R-77	134.8 ohm, ½ watt
R-53	75 K ohm, 1 watt	R-78	345 ohm, ¼ watt
R-57	4 ohm, ¼ watt	R-79	85.6 ohm, ¼ watt
R-60	2443 ohm, ¼ watt	R-80	85.6 ohm, ¼ watt
R-61	2443 ohm, ¼ watt	R-81	345 ohm, ¼ watt
R-62	8.08 ohm, ¼ watt	R-82	85.6 ohm, ¼ watt
R-64	1217 ohm, ¼ watt	R-83	85.6 ohm, ¼ watt
R-65	1217 ohm, ¼ watt	R-84	345 ohm, ¼ watt
R-66	16.27 ohm, ¼ watt	R-85	85.6 ohm, ¼ watt
R-67	611 ohm, ¼ watt	R-86	85.6 ohm, ¼ watt
R-68	611 ohm, ¼ watt	R-87	345 ohm, ¼ watt
R-69	24.7 ohm, ¼ watt	R-88	85.6 ohm, ¼ watt
R-70	409 ohm, ¼ watt	R-89	85.6 ohm, ¼ watt
		R-100	75 K ohm, 1 watt

The following resistors have been deleted from the parts list:

R-58 R-59 R-63

Miscellaneous:	Tubes:
L-15 0.8 μh choke	V-7 6AH6


V1
12AU7
MULTIVIBRATOR
V2
6AK5
SYNC. AMPL.
V3
2D21
1ST. PULSE GEN.
V4
6AL5
LIMITER
V5
2D21
2ND PULSE GEN.
V6
6AQ5
PULSE GATE
V7
6AH6
VIDEO AMPL.
+250V.
J1
TRIGGER
IN
TRIGGER
EXT
INT
J2
NEG. OUT
J3
PULSE
PULSE
WIDTH
P1
115V
AC
F1
3A.
OFF
ON
CW
PULSED RF
VIDEO PULSE
500 Ω
VIDEO PULSE
50 Ω
CW LEVEL
(INT)
PULSE
LEVEL
(INT)
V8
6AK5
V9
6AK5
RF
OSCILLATORS
RF GATE
V10
6BH6
V11
6BH6
FIL. V8 & V9
FIL. V10 & V11
6.3V AC
750V.
5V.
T 101
T 102
V101
5U4
V102
6X4
V103
6X4
V104
OA2
V105
OB2
V106
OA2
M1
μA
+150V
+100V
+50V
-38V
-55V
-220V
VAR
.5DB
1DB
2DB
3DB
5DB
10DB
20DB
20DB
20DB
20DB

NOTE
1 UNLESS OTHERWISE INDICATED
ALL RESISTANCES IN OHMS
ALL CAPACITANCES IN μμf
2 ● INDICATES FACTORY SELECTED COMPONENT (VALUE APPROX)
3 VOLTAGE READINGS TAKEN WITH S2 ON PULSED RF & S1 ON INT

SCHEMATIC DIAGRAM RADA-PULSER SR.

KAY ELECTRIC CO. PINE BROOK, N.J.
KD-3001J-A.U.A. 23611

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Company ....

Div. or Dept. ....

Street ....

City, Zone, State ....

Telephone No. ....

Do you use this instrument? ....☐

Maintain or repair it? ....☐

Should we be doing something to help you?..

....

....

Send extra manual on Model... .

Send general data..☐

19002